

Tech Notes- Lightning in the Shop!

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Several years ago one of my customers reported his tractor had been hit by lightning and he needed my help. I didn't believe it at first but it turned out to be true. Overnight while sitting in the field the tractor was hit.

This was an almost new Massey 8220 tractor equipped with Trimble RTK for steering. The antenna for the 900 Mhz radio link was completely blown apart and all the electronics was ruined. Before the tractor made it back into operation all the tractors controlling computers and electronics needed to be replaced.

Lightning strikes are of course very unusual but more the more common cause of these big electronic failures can come from simple maintenance procedures gone wrong.

Lightning strikes in the tool kit!



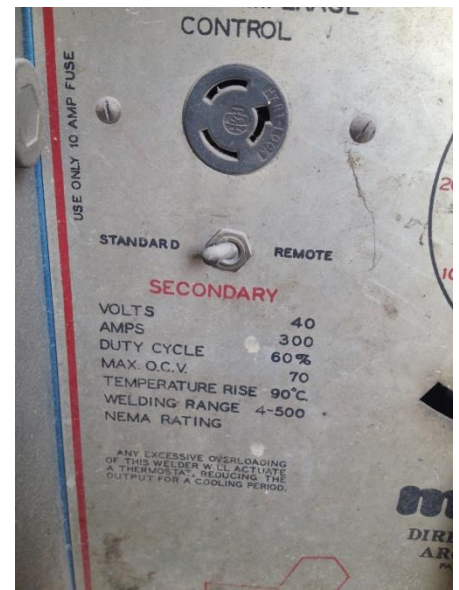
This old shop welder powers the connection by using 40 VOLTS of DC power at a capacity of 300 AMPS. That's a LOT of power! Very large wires are used to make the connection from the welder to the rod and weld point. When you try to push that current through the smaller diameter rod, it burns like a fuse would. The operator just keeps pushing the contact "rod" forward and the weld point just continues to burn. The successful weld has created temperatures hot enough to melt all the metals together perfectly.

I got a call from Bill Lehmkuhl, president of Precision Agri-Services in Minster Ohio after the Memory Day Holiday weekend. He told me of five different welding events that caused serious damage to electronic systems that had been fitted to sprayers and planters over the weekend.

Things happen to field machines through the season that need repaired quickly. When a boom breaks on a sprayer or components are added to a planter or other machine, pieces may need to be welded.

Creating a solid welded repair requires some skill in itself but lots of damage can occur if some safe welding procedures are not followed.

Welders create the heat necessary to melt the steel components by pushing large amounts of current through the rod or wire causing it to burn. The current flows through the rod to the frame or other steel being welded.



Where things go wrong is when there isn't a good path for the current as it travels from the welder to the rod and weld point.

The positive connection for the welder is the rod or tip so that will always be at the site of the actual weld. The ground connection is the variable and placement is important. The absolute worst place to attach the welder ground is the battery ground. The idea is to isolate the current flow of the welder from the electronics involved in the machine.

Keep the ground as close as possible to the weld point. Years ago it was considered acceptable to connect the ground anywhere on the frame since it was all connected through frame welds and bolted sections. Remember the welder is applying 40 or more volts of energy with as much as 300 amps available. The weld might be successful but all that current flowing through the frame can really cause total destruction of the on-board electronics.

Today the frame in many cases is insulated with plastic hinge points and simple deterioration of the metal. Planters may have slides that further insulate the electrical current flow. With that much power available the current is going to find the easiest path for the connection. That path might be the ground wire in the control harness for the electronics. The ground wires will quickly burn up.

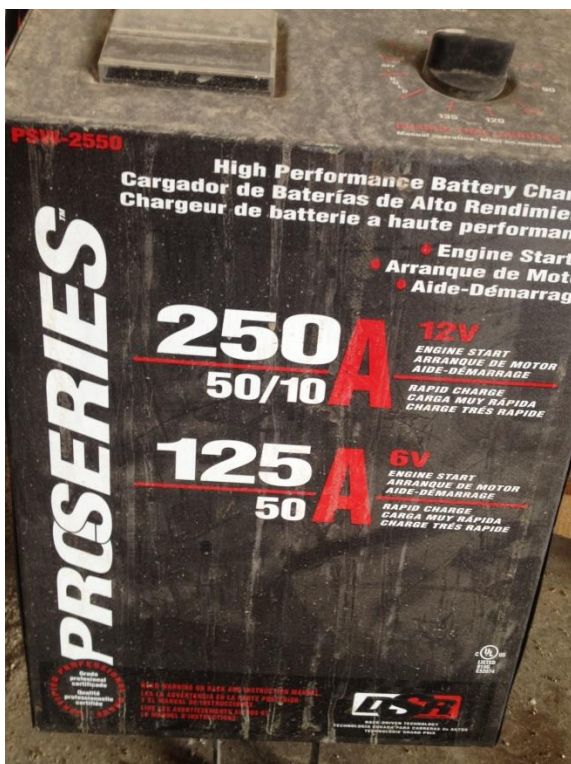
So the rule must be- Keep the ground connection as close as possible to the weld.

Never wrap or drape the ground connection on the boom or planter frame while welding. Although there may not be a direct electrical connection the high current flow causes the ground cable to act like a transformer transferring the energy to the sensitive electronic components on the machine.



I talked to the folks at the Hobart Welding Institute. They indicated that there are not any industry guidelines covering protecting the electronics while welding. The only recommendation they offered was to disconnect both the battery terminals while welding.

The other shop tool that can cause lots of electronic failures is the booster charger.



These handy tools when needed are great to provide a power boost to get a rig started but they can really cause trouble for the electronic systems.

When you connect the boost charger to a dead battery the available charging voltage might reach 25 volts or so for a short period of time. Typically a good battery keeps the voltage regulated with 12 volts as a low and 14 volts as the high.

Many of the small electronic components used in the modules have a maximum voltage of 16 Volts. The short burst of voltage created when the boost charger is first attached is enough to destroy the component and ruin the module.

The rule here must be to disconnect the battery connection from the vehicle before attaching the charger. Get the battery charged then reconnect the battery terminals.

You'll save yourself a lot of down time and costly repairs.

I hope you enjoyed this issue of Tech Notes. I hope to hear from you with questions and suggestions for future columns.

Remember, Tech Notes is written for the field guys. Please pass it on. You can review and download the past issues of Tech Notes by going to Croplife.com and searching tech notes or john dignan. Feel free to contact me anytime at johnd@agtester.com.

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